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unpublished ship-journal on the occasion of a voyage in the Southern Ocean, about the beginning of the present century, that, five years previous to the publication of the interesting observations of the Rev. Mr. George Jones, I made the following statement in the astronomical part of *Cosmos*:—

"On the whole the variations of the Zodiacal Light appear to me to depend upon variations inherent in the phenomenon, upon the greater or less intensity of the luminous processes going on in the ring. This is proved by my observations in the Southern Ocean, which indicated an opposite light in the heavens similar to that seen at sunset." (*Cosmos*, vol. iii. p. 589.)

I may remark further that I have been surprised at the increased brightness of the Zodiacal Light upon ascending to great altitudes. This was observable upon the lofty peaks of the Cordilleras 10,000 or 12,000 feet high; also in Mexico, in January 1804, at altitudes of only 7000 feet; and from the Cloister of Mount Cenis, where I remained with Gay Lussac several nights (in March 1805) at an altitude of 6350 feet, for the purpose of determining the intensity of the magnetic force during very intense cold, and ascertaining the quantity of oxygen contained in the atmosphere. It was, consequently, seen both in tropical and in temperate latitudes. But the variations in the brightness of the phenomenon cannot, according to my experience, be accounted for solely by the constitution of our atmosphere. There remains much still to be observed relative to this subject.

The following is a copy of the letter to which Baron Humboldt refers:—

(*From the Rev. George Jones, U.S.N. to the Editor of the Astronomical Journal, Cambridge, U.S.*)

"In my recent cruise in the U.S. steam-frigate Mississippi, chiefly in the China and Japan seas, but taking us also around the globe, I had excellent opportunities for observation of the Zodiacal Light. This light, you know, appears to the best advantage within the tropics, where it stretches upward to a great elevation, and is a remarkable object; but it is also very desirable to observe it in high latitudes; and in this also I was favoured, as our voyaging extended from 41° north to 53° south latitude; and in some instances our transitions, for weeks together, were very rapid, thus giving me opportunities for observing whether any parallax could be made or not.

"I was also fortunate enough to be twice near the latitude of 23° 28′ north, when the sun was at the opposite solstice, in which position the observer has the ecliptic, at midnight, at right angles with his horizon, and bearing east and west. Whether the latter circumstance affected the result or not I cannot say; but I then had the extraordinary spectacle of the Zodiacal Light, simultaneously at both east and west horizons, from 11 to 1 o'clock, for several nights in succession.

"In the first part of our cruise my observations were of a

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desultory character; but I soon began to see the necessity of great precision, and accordingly constructed star-charts from a celestial globe (a small but excellent one) that happened to be on board, which charts I afterwards had cut in wood at Canton; and thus I was furnished with materials for accurately recording all the changes of this phenomenon, not only in successive nights, but also in the successive hours of the same night. My rule was, to draw on my charts the boundaries of the Zodiacal Light as exhibited among the stars, with such annotations as the case required; then, again, do the same after an interval of an hour or half-hour; and so to continue, generally as long as the boundaries could be made out reliably; then, if the morning admitted it, to resume observations at the earliest possible hour, and so to proceed until the dawn. I have thus, in many instances, observations for every hour of the night.

" At an early period I began to query whether the moon, when near its full, might not give a Zodiacal Light: and at last, when I had gained more experience in observing, and in the peculiar character of this light, I was able to get, at different periods, fourteen reliable observations of what I think must be considered a Zodiacal Light produced by the moon. I have also two records of a distinct Zodiacal Light produced by the joint action of the sun and moon, *i. e.* at the hour when the moon, then near its first quartering, was about 65° above the western horizon; the reflexion from the combined light of the sun and moon being sufficient to overpower the moonlight proper, and thus to produce a decided stream of light in the sky within the Zodiacal-Light boundaries. The latter of these observations was the more remarkable, inasmuch as the moon was then *without* the boundary of this joint reflected light.

" You will excuse my prolixity in stating these varieties of observation, for the conclusion from all the data in my possession is a startling one. It seems to me that these data can be explained only by the supposition of a nebulous ring with the earth for its centre, and lying within the orbit of the moon. This conclusion seems to evolve itself, — 1st, from the simultaneous midnight east and west observations, which preclude the possibility of a ring around the sun *within* the earth's orbit; 2dly, from the great hourly lateral changes (often semi-hourly) in the boundaries of the Light, caused by the observer's change of place, in that time, as regards the ecliptic or axis of the Zodiacal Light, which lateral change in the Light is too great to allow of our considering it at a distance of 170,000,000 of miles, as its lower end would be, near dawn, if it is a ring around the sun and beyond the earth's orbit; and 3dly, from the moon's Zodiacal Light, if real, which I think it is. That it is a ring, the unbroken continuity of my observations satisfactorily determines. For more than two years, I never failed to see this Light, evening and morning, when the moon and clouds did not interfere; and, except one evening, I have continuous records of this kind.

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"I could get no parallax; but on the contrary, as we went south, the boundaries of the Zodiacal Light changed with us to the south among the stars; and so, *vice versâ*, towards the north, caused, doubtless, by the ring's presenting new portions of its wide reflecting surface to the sun's light.

"GEORGE JONES,
"Chaplain U.S. Navy."

Brooklyn, May 17, 1855.

Description of New or Improved Instruments for Navigation and Astronomy. Exhibited at the Paris Universal Exposition of 1855, by C. Piazzi Smyth, Astronomer Royal for Scotland, Professor of Practical Astronomy in the University of Edinburgh. Edinburgh: June, 1855.

The instruments described in this *brochure* are arranged in four distinct classes: viz. 1. Instruments of navigation; 2. Instruments of nautical astronomy; 3. Instruments of terrestrial astronomy; 4. Instruments of cosmical astronomy. The total number of instruments described is twenty. We extract the following description of an instrument which is classed under the head of Cosmical Astronomy:—

"No. 18. *Edinburgh Equatoreal, Universal.*—In all the equatoreally mounted telescopes intended for transportation to and employment in various latitudes, *i.e.* in all with which I have yet had the fortune to meet, there has invariably been this feature of awkwardness; viz. that the centre of gravity of the instrument was not coincident with the centre of the arc for latitude adjustment, and was, indeed, considerably removed from it.

"Hence it arose that when one of these portable equatoreals, constructed to suit the latitude of London, was transported to the Cape of Good Hope, and had its polar axis sloped to suit the lower position there of the celestial pole, the centre of the weight of the instrument was in consequence thrown so far beyond the centre of the support, as to make it dangerously unsteady, or even incapable of standing.

"The present equatoreal is accordingly devised to meet this difficulty, by having the centre of gravity of telescope, polar axis, and, in short, the whole instrument, accurately concentric with the arc for the latitude adjustment. By this method it is brought about, that the equatoreal can be adjusted to suit either a polar or an equatoreal latitude, without any disturbance of the equilibrium of the stand.

"The little instrument exhibited may be regarded as a model of a large one, with certain proportions altered; but it was specially constructed for actual use with the naked eye, in observations of the zodiacal light and the courses of shooting stars."